

Appl. No. : **09/185,876**
Filed : **November 3, 1998**

REMARKS

The November 29, 2004 Office Action was based upon pending Claims 1-20, 22-52, 55, 57-67, and 69-71. This amendment amends Claims 1, 5, 7-9, 13, 16, 17, 19, 34, 38-44, 55, 57, 64, 67, and 70, adds new Claims 72-75, and cancels Claims 2, 6, 26, 35, 37, and 69. Thus, after entry of this Amendment, Claims 1, 3-5, 7-20, 22-25, 27-34, 36, 38-52, 55, 57-67, and 70-75 are pending and presented for further consideration.

In the November 29, 2004 Office Action, the Examiner rejected Claims 1-20, 22-52, 55, 57-67, and 69-71 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,550,924 ("the Helf patent") in view of U.S. Patent No. 5,953,697 ("the Lin patent").

REJECTION OF CLAIMS 1-20, 22-52, 55, 57-67, AND 69-71 UNDER U.S.C. 103(a)

The Examiner rejected Claims 1-20, 22-52, 55, 57-67, and 69-71 under 35 U.S.C. 103(a) as being unpatentable over Helf in view of Lin.

Claims 1, 5, 9, 17, 34, 55, 57, 64, and 67

Helf appears to teach enhancing speech by suppressing constant background noise. Helf appears to exploit psychoacoustic masking. Psychoacoustic masking appears to operate within a band surrounding a frequency. See column 3 lines 26-31. Psychoacoustic masking is not similar to a filter which attenuates frequencies above and below the speech frequency range. Further, Helf appears use the attenuator (12) to attenuate the signal. The amount of attenuation appears to be determined from the noise versus signal decisions of the local speech versus noise detector for individual frequency components (34). See column 9 line 28-line 67. In addition, Helf appears to combine at adder 18 the current frame's signal to the previous frame's signal. See column 4 lines 45-50.

Helf does not have an aural filter which attenuates the low frequencies below the speech frequency range and attenuates the high frequencies above the speech frequency range. In Helf, the gain of the amplifier is not a function of the envelope amplitude of the input signal. Helf does not combine at least a portion of the expanded

signal and the original voice signal to produce an enhanced signal representing spoken words.

Lin appears to teach estimating the gain of a linear predictive vocoder based on the envelope of the synthetic speech to produce smoother and more natural outputs for vocoder applications. Lin does not combine at least a portion of the expanded signal and the original voice signal to produce an enhanced signal representing spoken words.

In contrast, an embodiment of the invention comprises an aural filter configured to filter the input human voice signal such that low frequencies below the speech frequency range and high frequencies above the speech frequency range are attenuated. In an embodiment, the invention further comprises a speech expander configured to amplify the filtered signal according to an amplifier gain to produce an expanded signal, where the amplifier gain is a function of an envelope amplitude of the filtered signal, and a combiner which combines at least a portion of the input human voice signal and the expanded signal.

Further, when the voice signal is operating at high volume levels, an embodiment of the invention emphasizes middle speech frequencies over low and high speech frequencies and when the voice signal is operating a low volume levels, an embodiment provides more low and high frequency components of the voice signal than when the voice signal is operating a high volume levels. In an embodiment, the system and method provide a transfer function that emphasizes middle speech frequencies over low and high frequencies at high volume levels and is flatter at low volume levels.

An embodiment of the invention provides a transfer function which approximates the inverse of the transfer function of human hearing. See page 3 lines 1-14. Stated differently, an embodiment provides a transfer function which approximates an inverse of loudness contours for human hearing. See page 3 lines 15-16. Alternatively stated, an embodiment of the invention provides a transfer function that approximates a complement of the Fletch-Munson curves for tones in a frontal sound field for humans. See page 14, lines 28-29.

In the present case, the Helf reference is directed toward enhancing human speech by reducing background noise, while the Lin reference is directed toward producing smoother synthetic speech for vocoder applications. Thus, there is no

Appl. No. : **09/185,876**
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suggestion or motivation to combine the Helf reference with other types of gain estimation schemes used for linear predictive coding vocoders, as found in the Lin reference.

Also, because neither the Helf reference, nor the Lin reference, teaches or suggests combining at least a portion of the expanded signal and the original voice signal to produce an enhanced signal representing spoken words, the Examiner has not provided prior art that teaches all the claim limitations.

Neither the Helf reference, nor the Lin reference, teaches or suggests, when the voice signal is operating at high volume levels, emphasizing middle speech frequencies over low and high speech frequencies and when the voice signal is operating at low volume levels, providing more low and high frequency components of the voice signal than when the voice signal is operating at high volume levels. Neither the Helf reference, nor the Lin reference, teaches or suggests providing a transfer function that approximates the inverse of the transfer function of human hearing, an inverse of loudness contours for human hearing, or a complement of the Fletcher-Munson curves. The Examiner has not provided prior art that teaches all the claim limitations.

Applicant therefore respectfully submits that Claims 1, 5, 9, 17, 34, 55, 57, 64, and 67 are patentably distinguished over the cited references and Applicant respectfully requests allowance of Claims 1, 5, 9, 17, 34, 55, 57, 64, and 67.

Claims 2-4, 6-8, 10-16, 18-20 and 22-33, 35-52, 58-63, 65-66, and 69-71

Claims 2-4, 6-8, 10-16, 18-20 and 22-33, 35-52, 58-63, 65-66, and 69-71, which depend from Claims 1, 5, 9, 17, 34, 57, 64, and 67, respectively, are believed to be patentable for the same reasons articulated above with respect to Claims 1, 5, 9, 17, 34, 57, 64, and 67, respectively, and because of the additional features recited therein.

NEW CLAIMS

New Claims 72-75 have been added to more fully define the Applicant's invention and are believed to be fully distinguished over the prior art of record.

Appl. No. : 09/185,876
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REQUEST FOR TELEPHONE INTERVIEW

Pursuant to M.P.E.P. § 713.01, in order to expedite prosecution of this application, Applicants' undersigned attorney of record hereby formally requests a telephone interview with the Examiner as soon as the Examiner has considered the effect of the arguments presented above. Applicant's attorney can be reached at (949) 721-2998 or at the number listed below.

CONCLUSION

Applicants have endeavored to address all of the Examiner's concerns as expressed in the outstanding Office Action. In light of the above remarks, reconsideration and withdrawal of the outstanding rejections is specifically requested.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: 2/24/05

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